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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/713,479	11/15/2000	William Romine	QSOF0.050A	3574

20995 7590 02/27/2003

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EXAMINER

SCHRANTZ, STEPHEN D

ART UNIT	PAPER NUMBER
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2177

DATE MAILED: 02/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/713,479

Applicant(s)

ROMINE ET AL.

Examiner

Steve Schrantz

Art Unit

2177

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 November 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "120" and "132" have been used to designate several clients and processes respectively. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to because they fail to show necessary textual labels of features or symbols in Fig. 1 as described in the specification. For example, placing a label, "database management system" with element 110 of Fig. 1, would give the viewer necessary detail to fully understand this element at a glance. A *descriptive* textual label for *each numbered element* in these figures would be needed to fully and better understand these figures without substantial analysis of the detailed specification. Any structural detail that is of sufficient importance to be described should be shown in the drawing. Optionally, applicant may wish to include a table next to the present figure to fulfill this requirement. See 37 CFR 1.83. 37 CFR 1.84(n)(o) is recited below:

"(n) Symbols. Graphical drawing symbols may be used for conventional elements when appropriate. The elements for which such symbols and labeled representations are used must be adequately identified in the specification. Known devices should be illustrated by symbols which have a universally recognized conventional meaning and are generally accepted in the art. Other symbols which are not universally recognized may be used, subject to approval by the Office, if they are not likely to be confused with existing conventional symbols, and if they are readily identifiable.

(o) Legends. Suitable descriptive legends may be used, or may be required by the Examiner, where necessary for understanding of the drawing, subject to approval by the Office. They should contain as few words as possible."

***Specification***

3. The disclosure is objected to because of the following informalities:

The U.S. Provisional Application entitled "System and Method for Developing a Cost-Effective Reorganization Plan for Data Reorganization" does not have an application number associated with it as seen at page 1 line 14.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 12-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Bannon et al. (U.S. Patent 5,297,279).

Bannon teaches independent claim 12 by the following:

"one or more actions which block the execution of select data modification operations against an object by returning an error message in response to the select data modification operations" at

Art Unit: 2177

col. 17 lines 51-57. A write lock must be held in order for a new version of the object to be created in the database. If the lock is not held, an error is returned.

“one or more statements which, when attempted against the object, cause the one or more actions to be executed” at col. 17 lines 51-57. The error is returned after the statement is attempted against the object. The returning of the error is the executed action.

Bannon teaches dependent claim 13 by the following:

“wherein the one or more statements include at least one of insert, update, and delete” at col. 17 lines 51-57 and col. 23 lines 55-58. Bannon teaches the use of both Read-only locks and write locks. The write locks will let new data be written into the database. The writing of new information into the database can be considered an insert and an update.

Bannon teaches dependent claim 14 by the following:

“wherein the lock is formed from a procedure implemented within a database management system” at col. 6 lines 19-22. Bannon teaches that the present invention has locks implanted in it. At col. 1 lines 8-12, Bannon teaches that the present invention relates to a database management system. The locks are implemented in the system. As stated above, the locks allow for a particular type of access. If that access is not granted, the lock will return an error. Because the locks are capable of performing such tasks, the locks are formed from a procedure.

6. Claims 16 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Sockut et al. (U.S. Patent 6,026,412).

Sockut teaches independent claim 16 by the following:

“inserting a first marker into a log file containing records of modification operations against an original table, wherein the insertion occurs when data of the original table starts to be copied to a

Art Unit: 2177

reorganized table” at col. 7 lines 59-62. The definition of an RBA is taught at col. 1 line 64 to col. 2 line 5.

“inserting a second marker into the log file when the data of the original table is finished being copied to the reorganized table” at col. 7 line 63 to col. 8 line 16. END\_\_RECENT is the second marker that is added to the log after step 504. At col. 7 lines 63-65, Sockut teaches that step 504 consists of the copying of the original table to the reorganized table.

“inserting a third marker into the log file when select data modification operations are blocked from executing against the original table” at col. 8 lines 57-61. Select data modifications are blocked while read-only access continues to be available.

“collecting the records of the modification operations from the log file occurring after the first marker and up until the third marker” at col. 13 lines 3-6. The log is read from BEGIN\_\_RECENT to END\_\_RECENT-1, the two markers which define the transactions that are needed to synchronize the new table.

“applying the modification operations of the collected records to the reorganized file after determining that the second marker has been inserted” at col. 13 lines 9-10. The log entries are applied to the new data area in order to sync the new table with the old one.

Sockut teaches dependent claim 17 by the following:

“further comprising using a dummy table to insert at least one of the first, second, and third markers” at col. 7 lines 63-65. The old table is copied into a new table. The new table is a dummy table. At the end of the copying of the table, the second marker is inserted as taught at col. 8 lines 13-16. The copying of the old table into the new reorganized dummy table causes the second marker to be inserted.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-2, 4, 8-11, 19, 21, 22, 24-25, 29, 32, 34, 35, 37-38, 40, 42, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pereira et al. (U.S. Patent 6,122,640) in view of Teng et al. (U.S. Patent 6,460,048).

Pereira teaches independent claim 1 by the following:

“reorganizing data of an original table by copying the data to a reorganized table” at col. 3 lines 60-63. A reorganized copy of the original, or source, table is created before the SCN point.

“during the copying, allowing modifications to the data of the original table while collecting records of the modifications” at col. 4 lines 23-28. All transactions on the original table are logged and then the new table is updated with these transactions.

“when the copying completes, applying the modifications from the collected records against the reorganized table” at col. 4 lines 23-28. All transactions on the original table are logged and then the new table is updated with these transactions.

“applying a first trigger lock to the original table” at col. 3 line 65 to col. 4 line 4. The trigger locks the original (source) table.

“the first trigger lock blocking select data modification operations against the original table while allowing other operations against the original table” at col. 4 lines 22-25. The trigger lock does

Art Unit: 2177

not allow transaction or block modifications. At col. 3 lines 47-55, Pereira teaches that the database tables remain online allowing full availability during the reorganization process.

“applying any remaining modifications from the collected records against the reorganized table” at col. 4 lines 26-28. The two tables, the new reorganization table and the original source table, are synched so that each table contains the same information. The modifications from the collected records have been applied to the new table.

Pereira teaches that the new, or reorganization, table is not made available to users at col. 12 lines 65-67. The table is not locked, but the users are not able to access the table until it is renamed. Teng et al. does teach the locking of the reorganization table at col. 2 lines 19-24. The accesses are queued. The delay of access to the table demonstrates that select data modifications have been locked out of the reorganization table. It would have been obvious to one ordinarily skilled in the art at the time of the invention to lock the table. Pereira does not give users access to the reorganization table until after it is renamed, but Pereira places a lock on the table to ensure that the table will consist of correct information and will be properly switched with the original source table. The use of the lock to block particular access to the reorganization table simply reinforces the idea that those accesses are denied from the reorganization table.

“the second trigger lock blocking select data modification operations against the reorganized table while allowing other operations against the reorganized table” at col. 2 lines 19-26. Access requests are delayed but the reorganized table is renamed to the source table. The renaming of the reorganized table to the source table is one operation that is allowed. Users will not be able to operate on the reorganized table because it has not yet been made available to them.



Art Unit: 2177

“substituting the reorganized table for the original table” at col. 2 lines 24-26. The source table is renamed to a temporary name while the shadow, or reorganized, table is renamed to the original table.

“removing the second trigger lock” at col. 2 lines 17-30. The SWITCH phase is the substitution of the reorganized table for the original table. As taught at col. 2 lines 19-22, any access requests to the database objects are queued until the SWITCH is complete. Once the switch is complete, the requests are completed. Because access is then given to the reorganized table, the second trigger lock has been removed.

Pereira teaches dependent claim 2 by the following:

“wherein the other operations allowed by at least one of the first and second trigger locks comprises one or more structural modification operations” at col. 4 lines 23-28. The block modifications are structural modifications. These block modifications are logged and then the reorganization table is updated with the block modifications.

Pereira teaches dependent claim 4 by the following:

“during the application of the modifications from the collected records against the reorganized table, allowing additional modifications to the data of the original table while collecting additional records of the additional modifications” at col. 3 lines 59-65. The modifications are applied to the reorganized copy of the original table.

Art Unit: 2177

“when the modifications and at least portions of the additional modifications have been applied against the reorganized table, applying the first trigger lock to the original table” at col. 4 lines 1-4. The lock is placed on the source table.

“wherein the step of applying any remaining modifications includes applying any remaining modifications or additional modifications against the reorganized table” at col. 4 lines 23-28. The modifications are logged and later used to update the new table.

Teng teaches dependent claim 8 by the following:

“wherein the original table includes a table name, and wherein the step of substituting the reorganized table for the original table further comprises renaming the original table another name and naming the reorganized table the table name” at col. 2 lines 22-26. The old copy, or the original table, is renamed to a temporary name. The shadow copy, or the reorganized table, is then renamed to the name of the original table.

Pereira teaches dependent claim 9 by the following:

“further comprising archiving the original table” at col. 12 lines 63-65. The source or original table is renamed so that it can be archived. The original table is archived when it is saved for backup services.

Pereira teaches dependent claim 10 by the following:

“wherein the copying of the data of the original table to the reorganized table further comprises creating an original synchronization point, after which the records of modifications are collected” at col. 8 lines 25-39. The original table is locked and the new or reorganized table is created. The checkpoint is created to give a timeframe in which updates were not made to the

original table. The modifications after the checkpoint are logged so that they can later be used to update the reorganized table.

Teng teaches dependent claim 11 by the following:

“wherein before the application of the second trigger lock, the original table and the reorganized table are in synchronization with one another” at col. 2 lines 13-24. The reorganized table is a copy of the original table. The reorganization table is then updated with the logged transactions. Before the original table can be switched with the reorganization table, the reorganization table is locked thus delaying access to the table.

Pereira teaches dependent claim 19 by the following:

“reorganizing an original object by copying data from the original object to a reorganized object” at col. 3 lines 60-63. A reorganized copy of the original, or source, table is created before the SCN point.

“applying a trigger lock to the original object, the trigger lock blocking data modification operations from modifying the original object while allowing other operations to access the original object” at col. 4 lines 22-25. The trigger lock does not allow transaction or block modifications on the original object. At col. 3 lines 47-55, Pereira teaches that the database tables remain online allowing full availability during the reorganization process.

Pereira teaches dependent claim 21 by the following:

“wherein the other operations include one or more structural modification operations” at col. 4 lines 23-28. The block modifications are structural modifications. These block modifications are logged and then the reorganization table is updated with the block modifications.

Pereira teaches independent claim 22 by the following:

Art Unit: 2177

“reorganizing an original object by copying data from the original object to a reorganized object” at col. 3 lines 60-63. A reorganized copy of the original, or source, table is created before the SCN point.

“applying a trigger lock to the reorganized object, the trigger lock blocking data modification operations from modifying the reorganized object, while allowing other operations to access the reorganized object” at col. 2 lines 19-26. Access requests are delayed but the reorganized table is renamed to the source table. The renaming of the reorganized table to the source table is one operation that is allowed. Users will not be able to operate on the reorganized table because it has not yet been made available to them.

Pereira teaches dependent claims 24 and 37 by the following:

“wherein the other operations include one or more structural modification operations” at col. 8 lines 35-49. The reorganized table (the new table) is created after the original table is locked. The reorganized table receives all of the structural modifications, data definition language operations, which occur to the original table. The structural and data definition language operations are allowed while the tables are locked from other operations.

Pereira teaches dependent claim 25 and 38 by the following:

“wherein the one or more structural modification operations include consecutive data definition language operations” at col. 8 lines 35-49. The reorganized table (the new table) is created after the original table is locked. The reorganized table receives all of the structural modifications, data definition language operations, which occur to the original table. The structural and data definition language operations are allowed while the tables are locked from other operations.

Pereira teaches independent claim 29 by the following:

Art Unit: 2177

“at least one database file having a table of data and a log file” at Pereira col. 3 line 59 to col. 4 line 4. The transaction table is a log file of all of the transactions on the table of data.

“a database management system communicating with the at least one database file, thereby governing the modification of the data in the table” at Pereira col. 4 lines 26-28. The transaction contains all of the modifications. These modifications that are logged are used to update the new table with all of the transactions that have taken place since the source table was locked.

“a reorganization application communicating with the database management system to access the table and communicating with the database file to access the log file” at col. 4 lines 26-28. The log file is accessed and then used to bring the original and new table into sync.

“wherein the reorganization application is configured to copy the data of the table to a reorganized table” at Pereira col. 3 lines 60-63. A reorganized copy of the original, or source, table is created before the SCN point.

“to apply modifications from the log file corresponding to modifications to the table during the copying of the data” at Fig. 10A. The figure shows the processing of the transaction table, or the log file. Pereira describes the processing of the log file at col. 11 line 21 to col. 12 line 29.

“to substitute the reorganized table for the table, thereby reorganizing the data of the table” at col. 12 lines 40-54. After the log file has been applied to the reorganized table, the source and reorganized tables are substituted.

Pereira teaches dependent claim 32 by the following:

“the reorganization application comprising an execution thread which reorganizes an original object by copying data of the original object to a reorganized object” at col. 10 lines 33-48. The load thread copies the original table to the reorganized table.

Art Unit: 2177

“which applies a trigger lock to the original object, wherein the trigger lock blocks data modification operations from modifying the original object while allowing other operations to access the original object” at col. 10 lines 49-54. The table is made available to the users for OLTP activity. At col. 8 lines 29-34, Pereira teaches the locking of the source table to determine a reference point to update the reorganized table. The locking of the table is also a part of the system that uses threads. Pereira teaches a locking of the table with the threads at col. 10 lines 66-67.

Pereira teaches dependent claim 34 by the following:

“wherein the other operations include one or more structural modification operations” at col. 8 lines 35-49. The reorganized table (the new table) is created after the original table is locked. The reorganized table receives all of the structural modifications, data definition language operations, which occur to the original table. The structural and data definition language operations are allowed while the tables are locked from other operations.

Pereira and Teng teaches independent claim 35 by the following:

“the reorganization application comprising an execution thread which reorganizes an original object by copying data of the original object to a reorganized object” at Pereira col. 10 lines 33-48. The load thread copies the original table to the reorganized table.

“... and which applies a trigger lock to the reorganized object, wherein the trigger lock blocks data modification operations from modifying the reorganized object while allowing other operations to access the reorganized object” at col. 2 lines 19-26. Access requests are delayed but the reorganized table is renamed to the source table. The renaming of the reorganized table

Art Unit: 2177

to the source table is one operation that is allowed. Users will not be able to operate on the reorganized table because it has not yet been made available to them.

Pereira teaches independent claim 42 by the following:

“applying a trigger lock to an object, wherein the trigger lock prevents a data modification operation that modifies data associated with object” at col. 8 lines 25-34.

“allows one or more structural operations that modify the definition of the object” at col. 8 lines 35-49. The reorganized table (the new table) is created after the original table is locked. The reorganized table receives all of the structural modifications, data definition language operations, which occur to the original table. The structural and data definition language operations are allowed while the tables are locked from other operations as taught at col. 4 lines 22-25. Every transaction or modification on the database is recorded in the log.

Pereira teaches dependent claim 44 by the following:

“wherein the trigger lock blocks select modification activity against the object in order to synchronize the data within the object with another object” at col. 8 lines 25-39.

9. Claims 3, 20, 23, 27-28, 30-31, 33, 36, 41, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pereira et al. (U.S. Patent 6,122,640) in view of Teng et al. (U.S. Patent 6,460,048) as applied to claims above, and further in view of Sockut et al. (U.S. Patent 6,026,412).

Pereira teaches that the source table is locked and read in order to determine the contents of the table that need to be copied at col. 7 lines 61-67. Pereira does not teach that the source table is read only. Teng teaches the managing the names of the source and reorganized tables as

Art Unit: 2177

taught at col. 1 lines 9-12. Teng teaches more about the reorganization through other patents as taught at col. 1 lines 33-45. Sockut teaches read-only access to the old area, or the original table as taught at col. 8 lines 2-4 and col. 8 lines 60-61. It would have been obvious to one ordinarily skilled in the art at the time of the invention to have the locks allow read only access as taught by Sockut at col. 8 lines 57-61. The locks have forced all modifications to be placed in the transaction log as taught at Sockut col. 4 lines 5-10. The locks cause the data to be written to a log to be later applied as taught at col. 4 lines 9-10. Pereira teaches a form of read-only access at col. 12 lines 50-54 and col. 18 lines 8-9. By allowing read-only access to the table, the system can remain online during the reorganization process as taught at Pereira at col. 3 lines 47-50. The read-only access is needed for the reorganization of the table in both the substitution of the tables at col. 12 lines 47-54, and the copying of the original table as taught at Pereira col. 4 lines 23-25. Teng also incorporates the Sockut reference as taught at Teng col. 1 lines 40-45. Sockut U.S. Patent 6,026,412 is a continuation of application number 08/366,564. Sockut U.S. Patent 5,721,915 is also a continuation of application number 08/366,564.

Sockut teaches dependent claim 20 by the following:

“wherein the other operations include one or more read-only operations” at col. 8 lines 60-61.

The other operations allowed on the original table are read only.

Teng and Sockut teach dependent claim 23 and 36 by the following:

” wherein the other operations include one or more read-only operations” at Teng col. 2 lines 49-51. Teng teaches that the reorganized object, or shadow object, is capable of being accessed. Sockut teaches the read-only access at col. 8 lines 60-61. Because the shadow object actually becomes the origin table, the same type of access is allowed to both tables.



Pereira and Sockut teach dependent claim 27 by the following:

“reorganizing an original object by copying data from the original object to a reorganized object” at Pereira col. 3 lines 60-63. A reorganized copy of the original, or source, table is created before the SCN point.

“substituting the reorganized object for the original object” at Pereira col. 2 lines 24-26. The source table is renamed to a temporary name while the shadow, or reorganized, table is renamed to the original table.

“allowing read-only access to the data during at least a portion of the process of substituting the reorganized object for the original object” at Sockut col. 8 lines 60-61. The other operations allowed on the original table are read only.

Pereira and Sockut teach dependent claims 28 and 41 by the following:

“wherein the read-only access to the data includes read-only access during multiple data definition language operations” at Pereira col. 8 lines 35-49. The reorganized table (the new table) is created after the original table is locked. The reorganized table receives all of the structural modifications, data definition language operations, which occur to the original table. The structural and data definition language operations are allowed while the tables are locked from other operations. Pereira also teaches that the information is available during the reorganization process at col. 3 lines 52-55. The object will be available during data definition language operations. Sockut teaches the read-only access at col. 8 lines 60-61 as taught above.

Sockut teaches dependent claim 30 by the following:

“wherein the reorganization application is further configured to apply a trigger lock to the table, thereby blocking select data modification language operations while allowing at least read-only

Art Unit: 2177

operations” at col. 8 lines 57-61. Some of the operations are quiesced while the reader is still allowed read-only access.

Pereira, Teng, and Sockut teach dependent claim 31 by the following:

“wherein the reorganization application is further configured to apply a trigger lock to the reorganized table” at Pereira col. 3 line 65 to col. 4 line 4.

“thereby blocking select data modification language operations while allowing one of one or more read-only operations and one or more data definition language operations” at Teng col. 2 lines 49-51. Teng teaches that the reorganized object, or shadow object, is capable of being accessed. Because the shadow object actually becomes the origin table, the same type of access is allowed to both tables. Pereira teaches the data definition language operations at col. 8 lines 35-49. The reorganized table (the new table) is created after the original table is locked. The reorganized table receives all of the structural modifications, data definition language operations, which occur to the original table. The structural and data definition language operations are allowed while the tables are locked from other operations.

Sockut teaches dependent claim 33 by the following:

“wherein the other operations include one or more read-only operations” at col. 8 lines 57-61.

Some of the operations are quiesced while the reader is still allowed read-only access.

Pereira teaches independent claim 40 by the following:

“the reorganization application comprising an execution thread which reorganizes an original object by copying data of the original object to a reorganized object” at Pereira col. 10 lines 33-48. The load thread copies the original table to the reorganized table.

Art Unit: 2177

“... which substitutes the reorganized object for the original object” at Pereira col. 12 lines 40-54. The reorganized object is renamed to the original object. By renaming the objects, the invention is substituting the reorganized object for the original object.

“wherein the execution thread also allows read-only access to the data during at least a portion of the substitution of the reorganized object for the original object” at col. 12 lines 50-67. The users have read only access to the source table. Lines 55-67 better describe the methods that allow a user to have access to the table during the reorganization process.

Pereira and Sockut teach independent claim 45 by the following:

“applying a trigger lock to an object” at Pereira col. 3 line 65 to col. 4 line 4. The trigger locks the original (source) table.

“wherein the trigger lock prevents a data modification operation that modifies data associated with object” at Pereira col. 4 lines 1-2. The transactions are the data modifications.

“allows a read-only operation that accesses the object” at Sockut col. 8 lines 57-61. Some of the operations are quiesced while the reader is still allowed read-only access.

10. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pereira et al. (U.S. Patent 6,122,640) in view of Teng et al. (U.S. Patent 6,460,048) as applied to claims above, and further in view of Lakhamraju et al. (U.S. Patent 6,343,296) and Suver (U.S. Patent 6,016,497).

Teng teaches that a database has a database descriptor (DBD) that stores the relationships at col. 5 lines 61-64. At col. 6 line 62 to col. 7 line 7, Teng teaches that descriptor file is updated so that the shadow copy, or the reorganized table, is switched with the original table. Because

Art Unit: 2177

the tables are switched, it is assumed that the relationship constraints are applied. Lakhamraju further teaches that the integrity is maintained for related objects in a database at col. 4 lines 48-55. Lakhamraju teaches the searching of the parents and relationships at col. 5 lines 38-59. It would have been obvious to one ordinarily skilled in the art at the time of the invention to maintain the references within the database. Because the reorganized table is switched with the table, the reorganized table should be a current copy of the original table. The relationship constraints must be applied to the reorganized table in order to ensure the integrity of the system. If the reorganized table does not have the relationship constraints, the reorganized table is not a substitute of the original source table. The relationship constraints must be maintained in the copy of the latest version.

Lakhamraju teaches the references between objects. He does not teach that these objects are stored in a table. Suver teaches the storage of objects in a table at col. 8 lines 46-49. The objects are decomposed into multiple tables. Suver later talks of linking objects across several tables at col. 12 lines 19-23. It would have been obvious to one ordinarily skilled in the art at the time of the invention to store the objects in a table. By storing objects in a table, the user can gain the benefits of an object-oriented system with the query and access abilities of a relational database system.

Teng teaches dependent claim 6 by the following:

“wherein the application of the at least one relational constraint to the reorganized table includes applying a trigger procedure to the reorganized table” at col. 2 lines 22-26. The accesses are queued on the shadow copy, or the reorganized copy. Once the table is made available, the accesses are allowed.

Lakhamraju teaches dependent claim 7 by the following:

“wherein the application of the at least one relational constraint to the reorganized table includes applying a trigger lock to another table” at col. 4 lines 40-47. The exact parents of the object stored in the table are locked and updated. As taught above, the objects can be spread across several tables.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bannon et al. (U.S. Patent 5,297,279) as applied to claim 12 above, and further in view of Pereira (U.S. Patent 6,122,640).

Bannon teaches that a database management system will allow for many locks that can access a database. Bannon does not teach structural modifications against the object. Pereira does teach the use of locks to block access of data at col. 4 lines 1-4. Pereira further teaches the allowance of structural modifications or data definition languages modifications at col. 8 lines 36-49. It would have been obvious to one ordinarily skilled in the art at the time of the invention to allow structural modifications. By allowing structural modifications, the database management system is able to allow as many transactions as possible on the database. Structural modifications are allowed to take place while keeping the database online and accessible.

12. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sockut et al. (U.S. Patent 6,026,412) as applied to claims above, and further in view of Pereira (U.S. Patent 6,122,640).

Art Unit: 2177

Sockut teaches the use of the markers to indicate in the log the particular steps of the reorganization process. Sockut does not teach that the process is multithreaded. Pereira does teach that the invention is multithreaded at col. 10 lines 33-37. Pereira teaches two threads that are in charge of loading and unloading the data. As taught by Sockut, the entries into the log are a part of the unload process. Because one thread is in charge of the unload process, the markers are placed in the log by the unload thread. The markers are inserted when the process starts; the old table is copied when the lock is placed on the original table. It would have been obvious to one ordinarily skilled in the art at the time of the invention to create the invention with multiple threads. Threads are simpler parts of the overall process as taught at Pereira col. 10 lines 33-37. The load and unload threads are a smaller part of the entire reorganization process. Sockut's invention completes the reorganization through the processes. One advantage of threads is that they can be used to simplify the overall process by breaking the process into several subparts as taught at col. 10 lines 33-37.

13. Claims 26 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pereira et al. (U.S. Patent 6,122,640) in view of Teng et al. (U.S. Patent 6,460,048) as applied to claims above, and further in view of Lakhamraju et al. (U.S. Patent 6,343,296).

Teng teaches that a database has a database descriptor (DBD) that stores the relationships at col. 5 lines 61-64. At col. 6 line 62 to col. 7 line 7, Teng teaches that descriptor file is updated so that the shadow copy, or the reorganized table, is switched with the original table. Because the tables are switched, it is assumed that the relationship constraints are applied. Lakhamraju further teaches that the integrity is maintained for related objects in a database at col. 4 lines 48-

Art Unit: 2177

55. Lakhamraju teaches the searching of the parents and relationships at col. 5 lines 38-59. It would have been obvious to one ordinarily skilled in the art at the time of the invention to maintain the references within the database. Because the reorganized table is switched with the table, the reorganized table should be a current copy of the original table. The relationship constraints must be applied to the reorganized table in order to ensure the integrity of the system. If the reorganized table does not have the relationship constraints, the reorganized table is not a substitute of the original source table. The relationship constraints must be maintained in the copy of the latest version.

Pereira, Teng, and Lakhamraju teach independent claim 26 by the following:

“reorganizing an original object by copying data from the original object to a reorganized object” at Pereira col. 3 lines 60-63. A reorganized copy of the original, or source, table is created before the SCN point.

“when the original object included one or more relational constraints, applying at least one of the one or more relational constraints to the reorganized object” at col. 4 lines 48-55. Lakhamraju teaches the searching of the parents and relationships at col. 5 lines 38-59.

“allowing at least read-only access to the reorganized object while applying the at least one or more relational constraints” at Teng col. 2 lines 49-51. Teng teaches that the reorganized table is capable of being accessed. Teng teaches that the reorganized object, or shadow object, is capable of being accessed. Because the shadow object actually becomes the origin table, the same type of access is allowed to both tables. Lakhamraju teaches the application of relational constraints at col. 4 lines 48-55

Pereira, Teng, and Lakhamraju teach independent claim 39 by the following:

“the reorganization application comprising an execution thread which reorganizes an original object by copying data of the original object to a reorganized object” at Pereira col. 10 lines 33-48. The load thread copies the original table to the reorganized table.

“wherein, when the original object included one or more relational constraints” at Lakhamraju col. 4 lines 48-55. Lakhamraju teaches the searching of the parents and relationships at col. 5 lines 38-59.

“the execution thread applies at least one of the one or more relational constraints to the reorganized object” at col. 4 lines 48-55. Lakhamraju teaches the application of relational constraints.

“wherein the execution thread allows at least read-only access to the reorganized object while applying the at least one or more relational constraints” at Teng col. 2 lines 49-51. Teng teaches that the reorganized table is capable of being accessed. Teng teaches that the reorganized object, or shadow object, is capable of being accessed. Because the shadow object actually becomes the origin table, the same type of access is allowed to both tables. Lakhamraju teaches the application of relational constraints at col. 4 lines 48-55

14. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pereira (U.S. Patent 6,122,640) in view of Teng et al. (U.S. Patent 6,460,048) as applied to claims above, and further in view of Bannon et al. (U.S. Patent 5,297,279).

Pereira and Teng both teach a lock that is used during the reorganization of a database, but the lock does not return an error. Bannon does teach a lock that returns errors at col. 17 lines



Art Unit: 2177

51-57 and col. 23 lines 55-58. It would have been obvious to one ordinarily skilled in the art at the time of the invention to allow the locks to return an error if a particular access is blocked. By blocking a particular access, the invention will allow both the system and the user to realize that a particular transaction was not executed properly.

### *Conclusion*

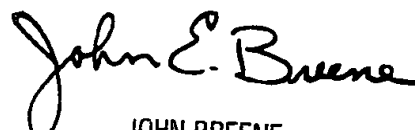
15. The prior art made of record in PTO-892 and not relied upon is considered pertinent to applicant's disclosure.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steve Schrantz whose telephone number is (703) 305-7690. The examiner can normally be reached on Mon-Fri. 8:15-4:45.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on (703) 305-9790. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Steve Schrantz  
February 24, 2003

  
JOHN BREENE  
SUPERVISORY PATENT EXAMINER  
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